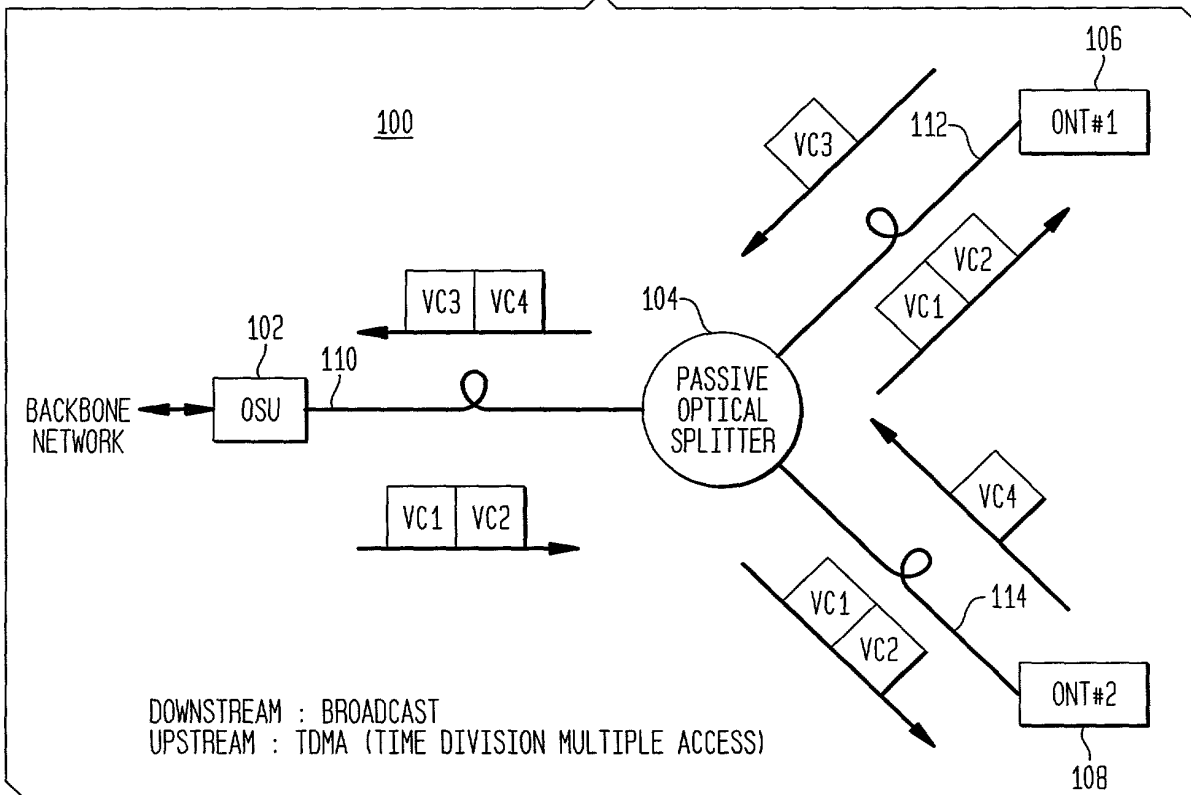
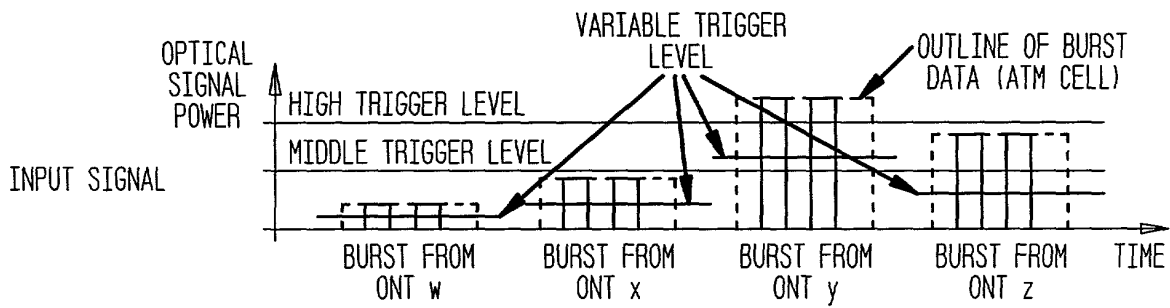


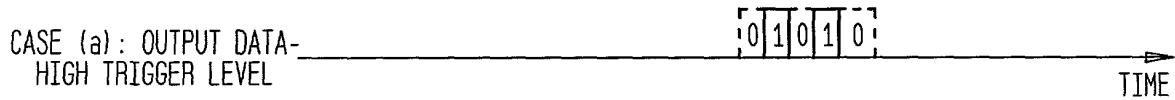
**FIG. 1**  
(PRIOR ART)



**FIG. 2A**  
(PRIOR ART)



**FIG. 2B**  
(PRIOR ART)



**FIG. 2C**  
(PRIOR ART)



**FIG. 2D**  
(PRIOR ART)



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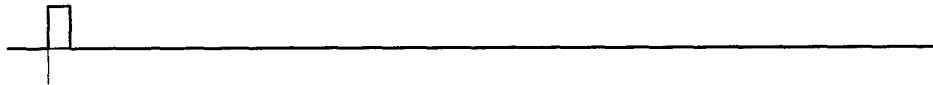
**FIG. 3A**

[1] DOWNSTREAM FRAME BOUNDARIES



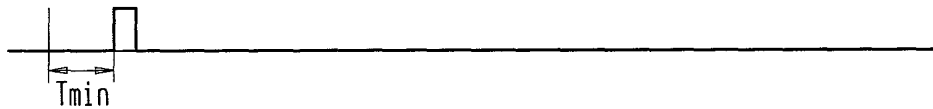
**FIG. 3B**

[2] DOWNSTREAM RANGING PLOAM CELL



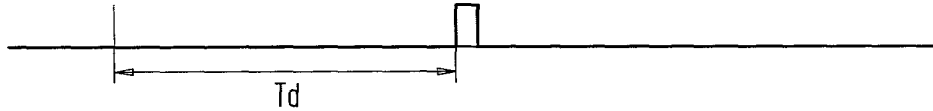
**FIG. 3C**

[3] UPSTREAM RANGING REPLY CELL ( $T_d=0$ )



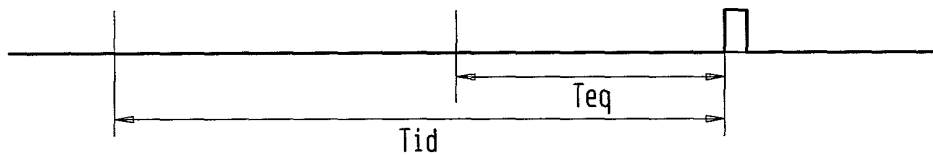
**FIG. 3D**

[4] UPSTREAM RANGING REPLY CELL ( $T_d>0$ )



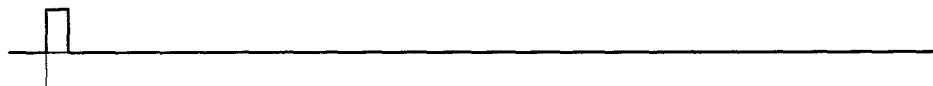
**FIG. 3E**

[5] UPSTREAM CELL AFTER RANGING



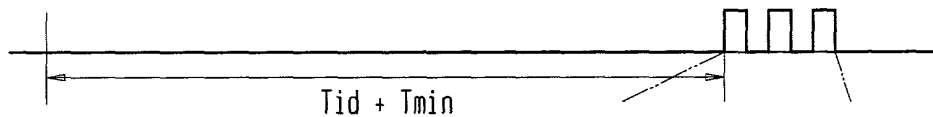
**FIG. 3F**

[6] DOWNSTREAM PLOAM CELL WITH GRANTS IN 1st, 2nd, 3rd TIME SLOT



**FIG. 3G**

[7] 3 UPSTREAM CELL IN 1st, 2nd, 3rd TIME SLOTS AFTER RANGING



**FIG. 3H**

[8] EXPANSION OF 3 UPSTREAM CELLS SHOWING POSITION OF bmr RESET PULSE

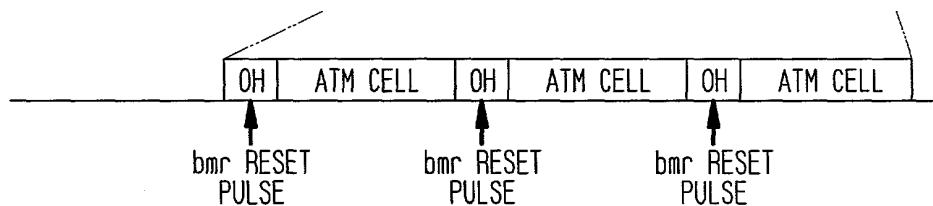
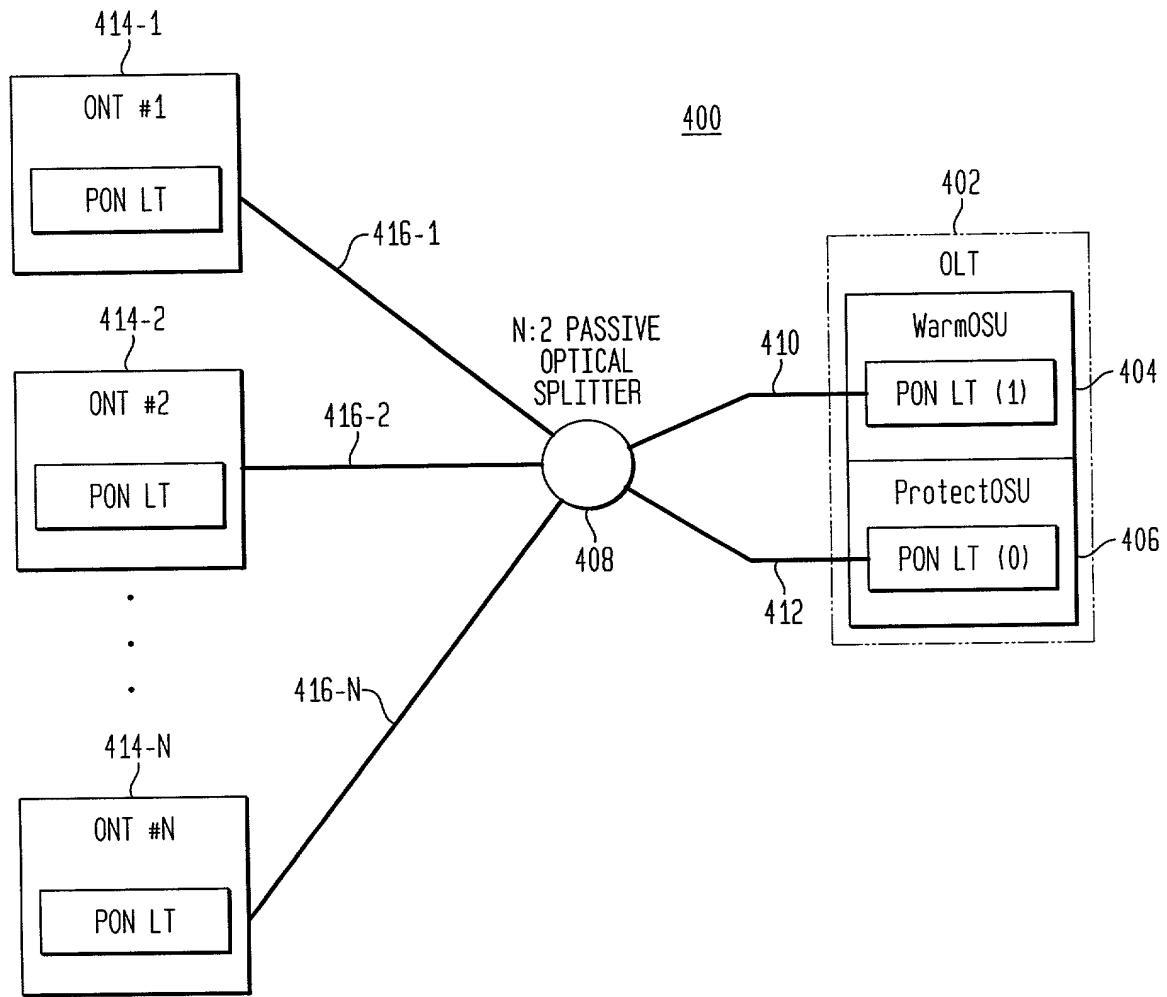
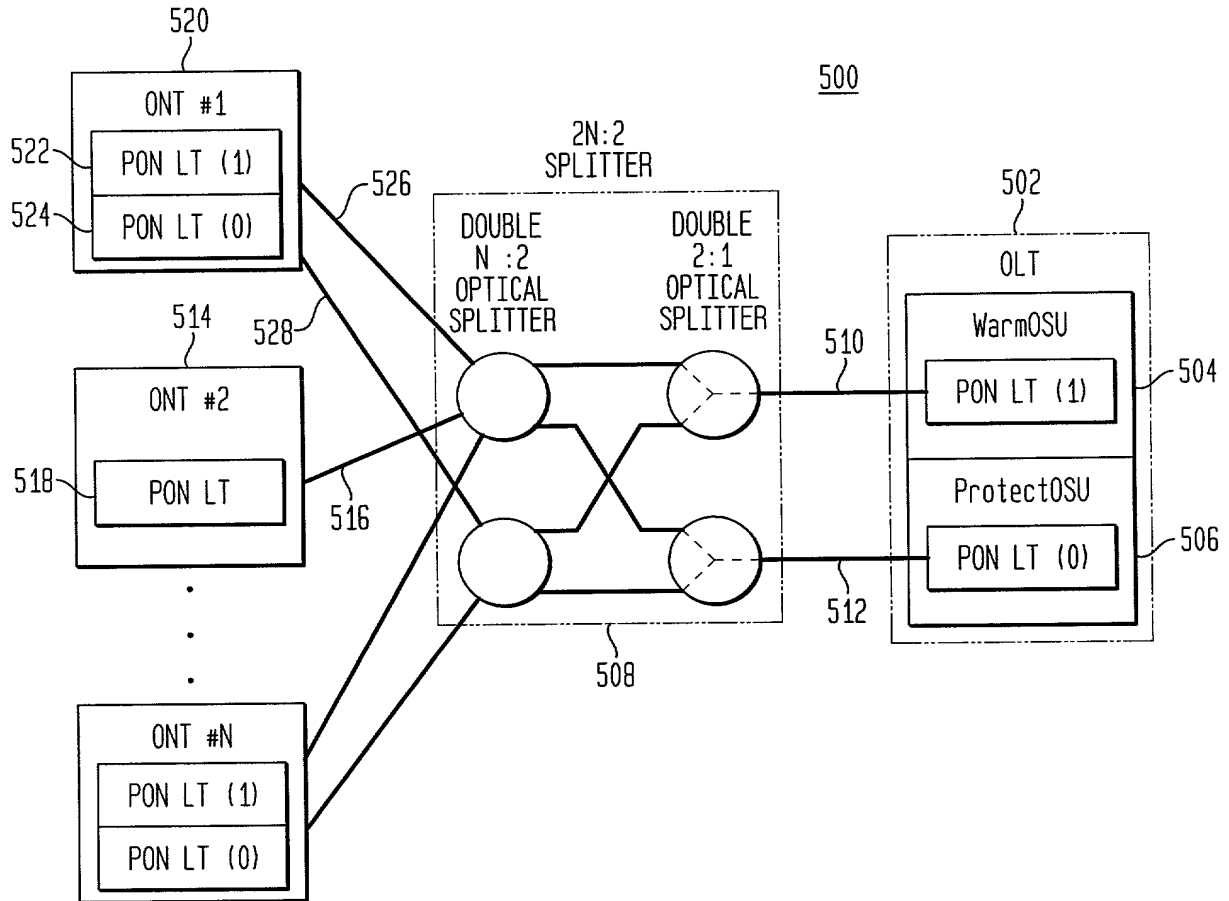


FIG. 4



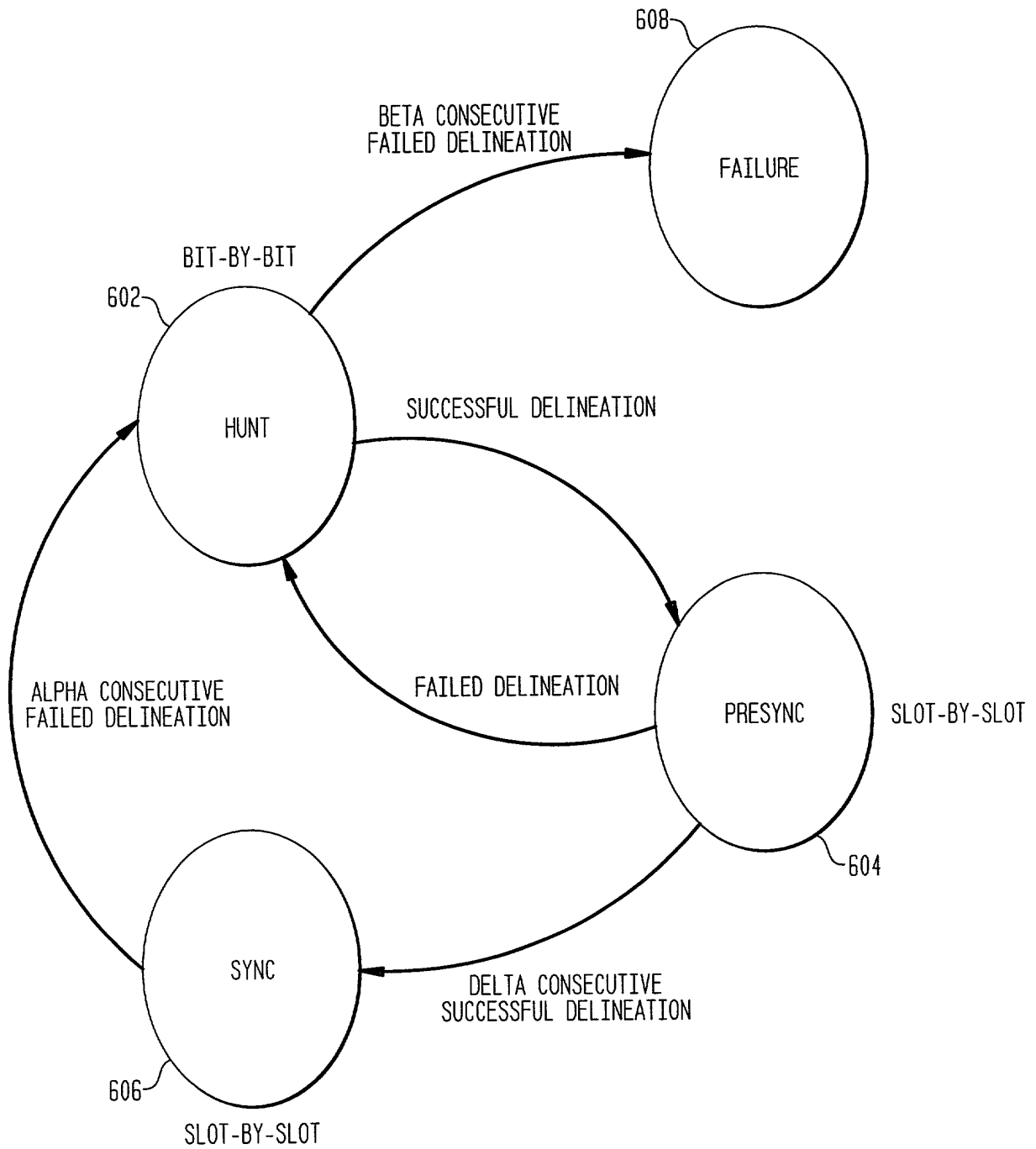
OLT-ONLY DUPLEX SYSTEM

FIG. 5



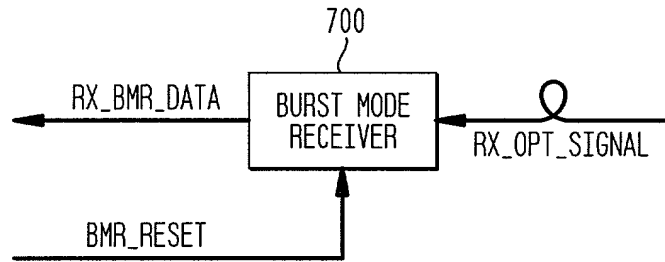
PARTIAL DUPLEX SYSTEM

**FIG. 6**



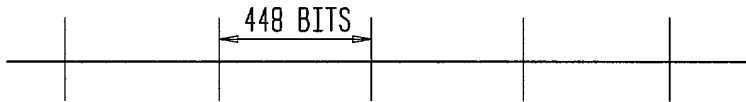
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**FIG. 7A**



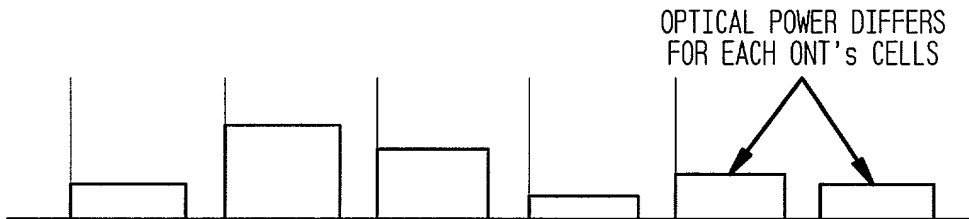
**FIG. 7B**

TIMING REFERENCE AT WarmOSU



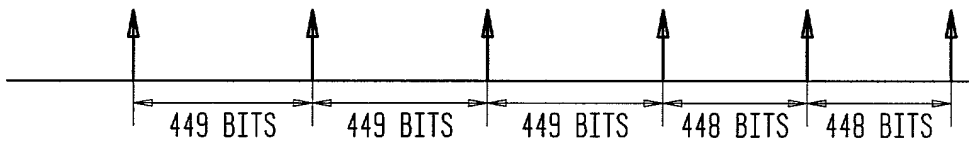
**FIG. 7C**

RX\_OPT\_SIGNAL (OPTICAL SIGNALS RECEIVED BY BURST MODE RECEIVER)



**FIG. 7D**

BMR\_RESET (BURST MODE RECEIVER  
RESET SIGNALS-SPACED OUT BY 449/448 BITS)



**FIG. 7E**

RX\_BMR\_DATA (OUTPUT OF BURST MODE RECEIVER)

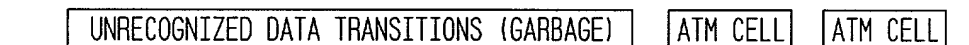


FIG. 8A

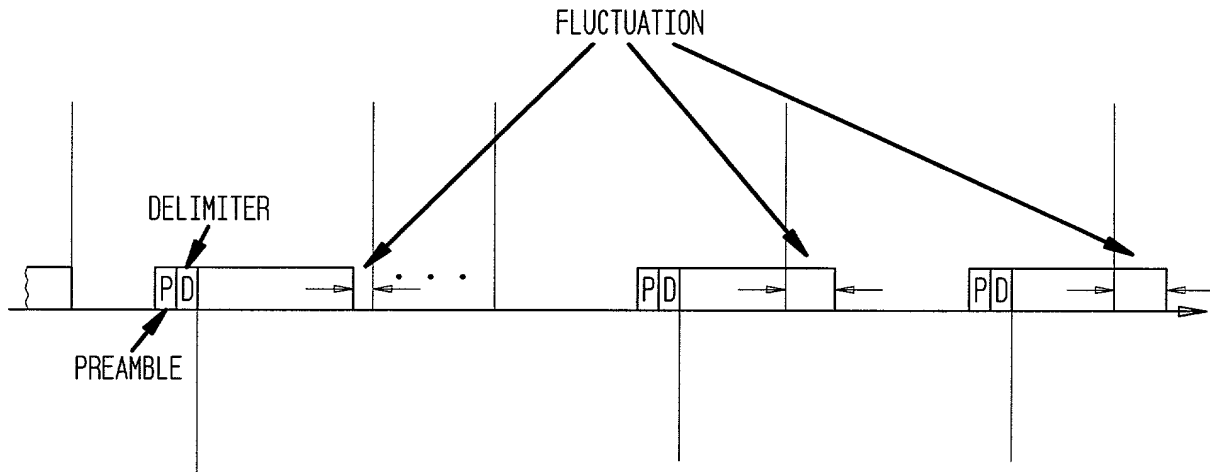


FIG. 8B

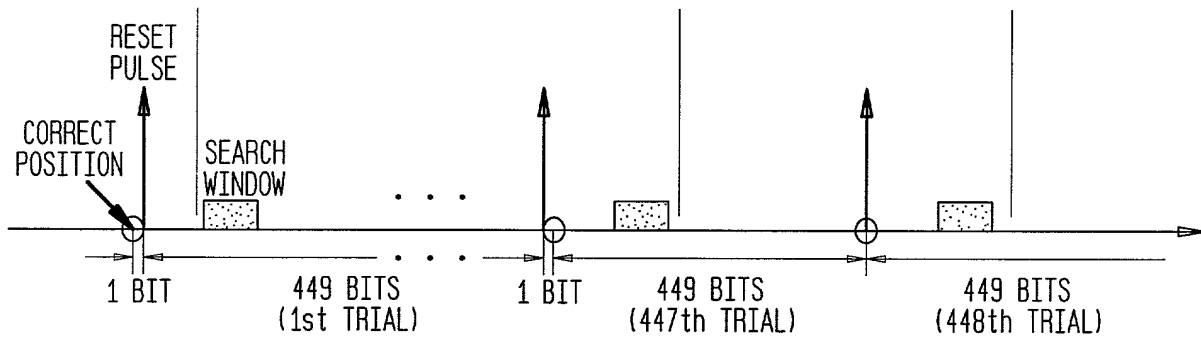


FIG. 9A

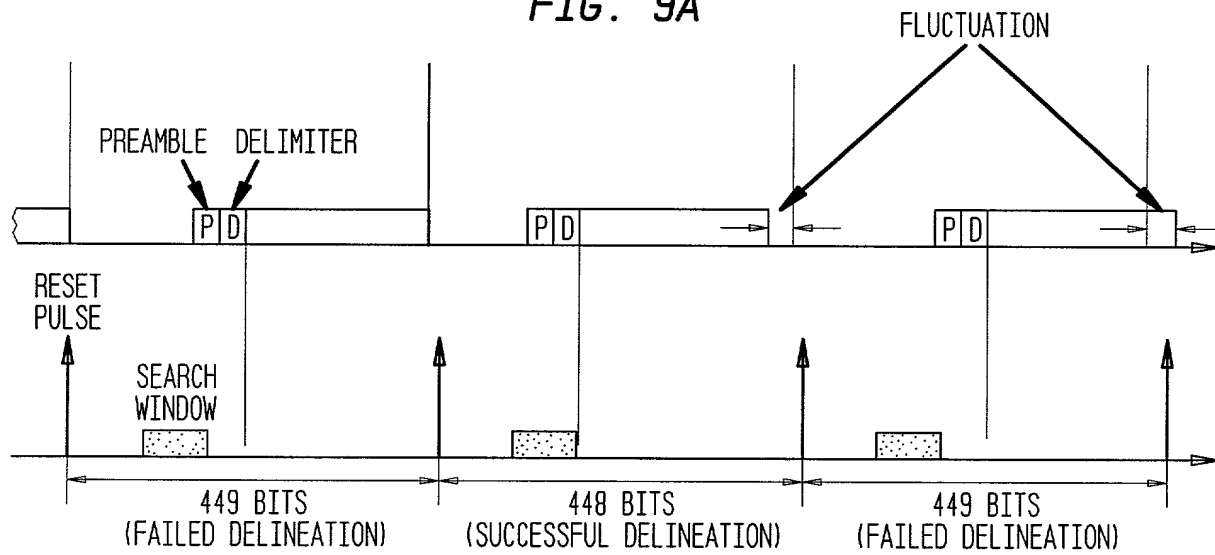
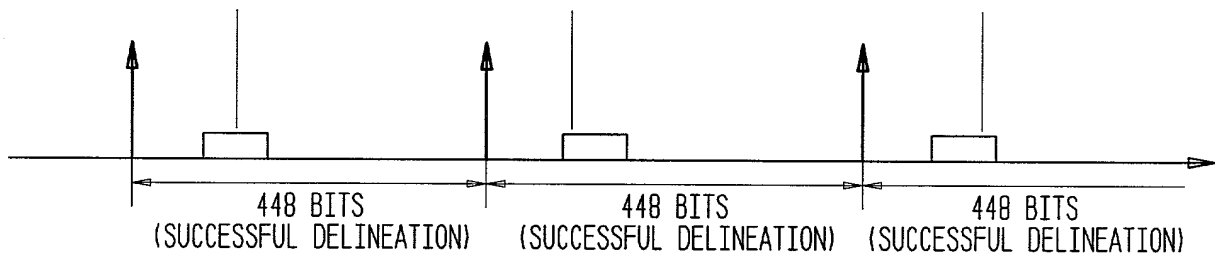


FIG. 9B



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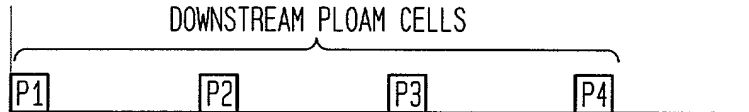
**FIG. 10A**

FRAME BOUNDARIES ON WarmOSU AND ProtectOSU (SYNCHRONIZED)



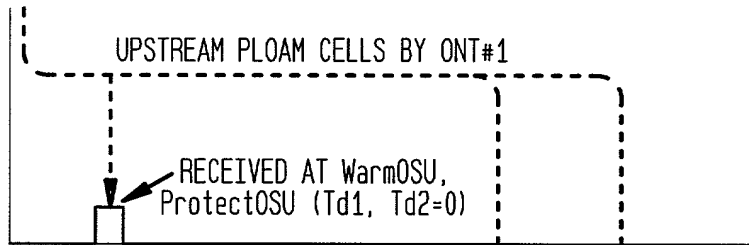
**FIG. 10B**

DOWNSTREAM PLOAM CELLS (PL1 CONTAINS PLOAM GRANT FOR ONT #1)



**FIG. 10C**

UPSTREAM RECEPTION OF PLOAM CELL FROM ONT #1 ( $Td1$ ,  $Td2=0$ )



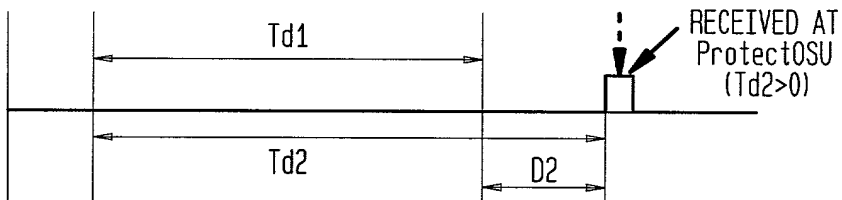
**FIG. 10D**

UPSTREAM RECEPTION OF PLOAM CELL FROM ONT #1 ( $Td1>0$ ) AT WarmOSU



**FIG. 10E**

UPSTREAM RECEPTION OF PLOAM CELL FROM ONT #1 ( $Td2>0$ ) AT ProtectOSU



$Td1$ : DELAY MEASURED AT WarmOSU

$Td2$ : DELAY MEASURED AT ProtectOSU

$D2$ : TIME DIFFERENCE BETWEEN START OF FRAME IN WarmOSU AND ProtectSU,  
DUE TO DIFFERENCE IN DISTANCE TO SPLITTER

\*SOF: START OF FRAME

FIG. 11

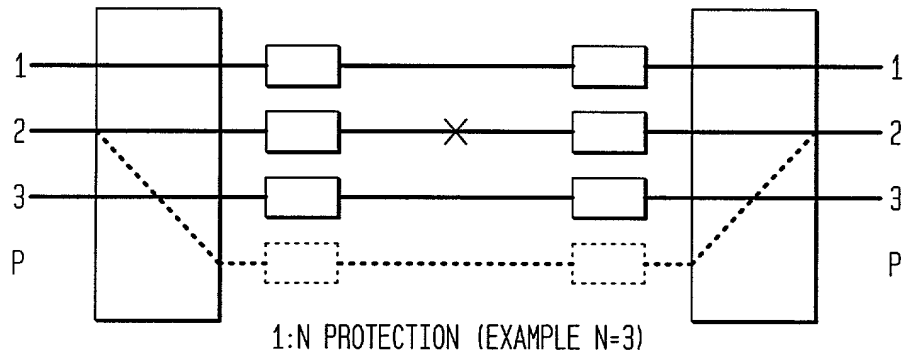
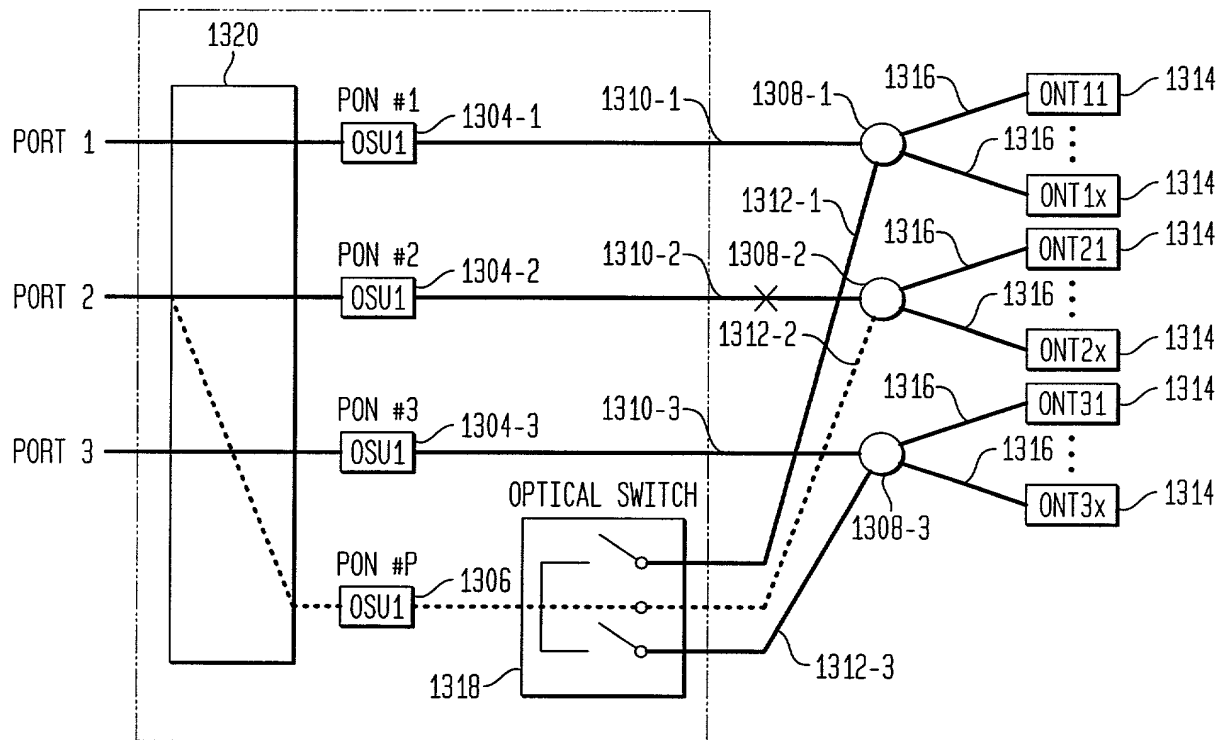
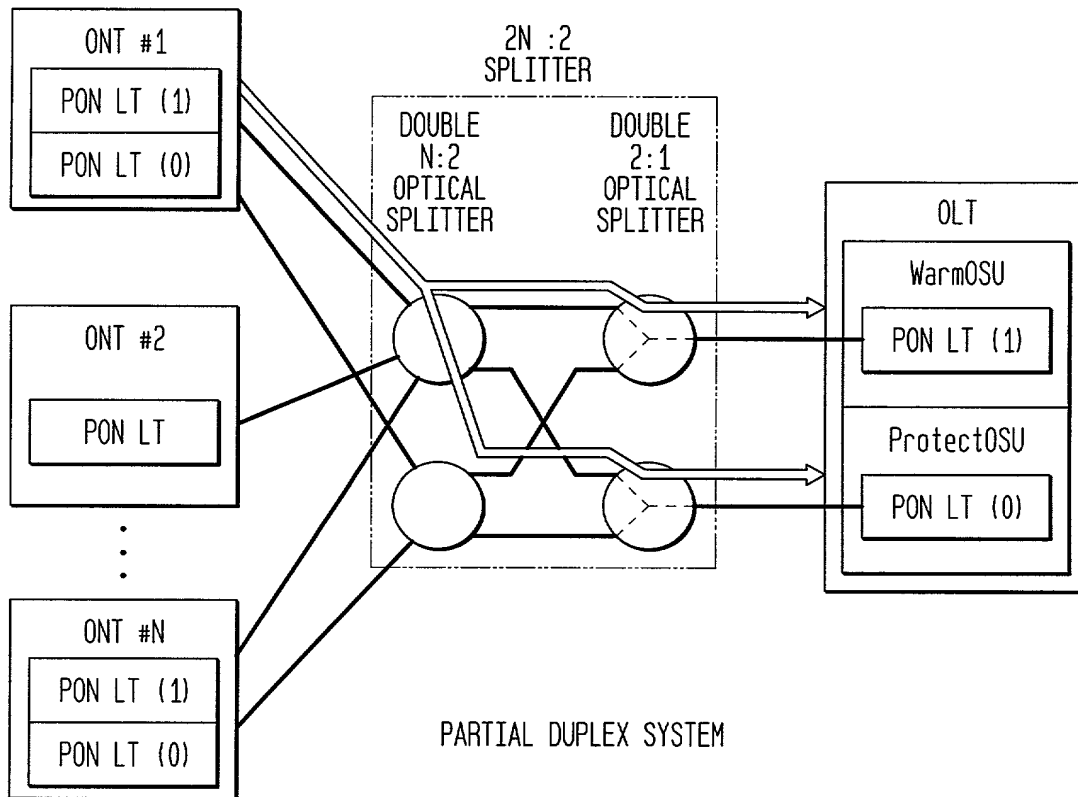


FIG. 12



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**FIG. 13**



**FIG. 14**

